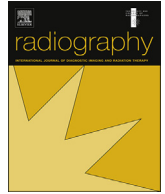




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Radiographer involvement in mammography image interpretation: A survey of United Kingdom practice

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ABSTRACT

Breast cancer is most often diagnosed using x-ray mammography. Traditionally mammography images have been interpreted and reported by medically qualified practitioners – radiologists. Due to radiologist workforce shortages in recent years some non-medical practitioners, radiographers, now interpret and report mammography images. The aims of this survey were to describe the characteristics and practices of radiographers who interpret and report mammography images in NHS hospitals in the UK, and in particular to establish the extent of their practice beyond low-risk asymptomatic screening cases.

This service evaluation demonstrated that UK radiographers are interpreting and reporting images across the full spectrum of clinical indications for mammography including: low-risk population screening, symptomatic, annual surveillance, family history and biopsy/surgical cases. The survey revealed that radiographers are involved in a diverse range of single and double reading practices where responsibility for diagnostic decision making is shared or transferred between radiologists and/or other radiographers. Comparative analysis of sub-group data suggested that there might be differences in the characteristics and practices of radiographers who interpret only low-risk screening mammograms and those who interpret and report a wider range of cases.

The findings of this survey provide a platform for further research to investigate how and why the roles and responsibilities of radiographers who interpret and report mammograms vary between organisations, between practitioners and across different examinations. Further research is also needed to explore the implications of variation in practice for patients, practitioners and service providers.

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Introduction

The inability of the medical (radiology) profession to keep pace with increasing demand for mammography image interpretation and reporting (MIIR) was recognised over 45 years ago.¹ Hillman et al.² in the USA were the first to suggest using non-medical personnel to supplement the mammography image interpretation (MII) workforce and in the UK pilot schemes to train radiographers to interpret and report screening mammograms were first initiated in the 1990s.^{3–6}

Radiographers in the UK have now been involved in MII for over 20 years. In 1995 they had a formal MII role in 6% (6/103) National Health Service Breast Screening Programme (NHSBSP) units⁷ and by 2008, 205 (69.7%) of the 10 consultant and 284 (260 qualified and 24 trainee) advanced practitioner radiographers working in the

NHSBSP interpreted mammography images.⁸ Price and Le Masurier's⁹ most recent NHS survey of longitudinal change in NHS radiographer roles revealed that radiographers were interpreting mammograms in 22% (38/177) responding Trusts.

The client population in breast screening programmes is 'low risk' and 'asymptomatic', including women without physical signs or symptoms of breast cancer and those in an age-defined group considered most likely to benefit from early detection of pre-clinical disease. Mammography is also performed in 'high risk' asymptomatic populations, to detect recurrence in people previously diagnosed and treated for breast cancer (annual surveillance mammography) and in people with a familial or genetic predisposition to breast cancer (family history screening), for example. Mammograms are also obtained from women outside screening programmes, and from men, who go to their doctor with symptoms that might indicate underlying breast disease (symptomatic cases).

Whilst radiographer involvement in NHSBSP MII is well-established, is monitored nationally and has an underpinning

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evidence base, little is known about the extent to which current UK radiographer involvement in MIIR goes beyond low-risk population screening cases. A postal survey of UK consultant breast radiographers published in 2014¹⁰ demonstrated that all 22 respondents (response rate 22/24; 91%) worked in symptomatic services but offered no further information about their MIIR practices. Kelly et al.'s¹¹ case study publication explained how appointing a consultant breast radiographer increased service capacity and reduced waiting lists because they delivered additional 'fast track' symptomatic clinics and were fully accountable for MIIR independent of radiologists.

The survey reported here was performed to elicit more information about the characteristics, roles, responsibilities and opinions of radiographers involved in MIIR in the UK. The aims of the survey were to:

- describe the demographic and professional characteristics of UK radiographers who interpret and report mammograms;
- determine how MIIR services are delivered and how diagnostic decision making responsibility is distributed between radiographers and radiologists;
- identify drivers for, and barriers to, radiographer involvement in MIIR;
- identify a population of radiographers who might participate in further research about radiographer performed MIIR.

Methods

This research used a quantitative cross-sectional 'survey' design to collect data on a series of variables at a single point in time.¹² The survey was designed to capture maximum variation across individual radiographers and workplace sites and to identify patterns of association.¹² The data collection instrument was a project-specific self-completion questionnaire intended to generate data from a large number of people, in standardised format, at relatively low cost and in a short period of time.¹³

The questionnaire was administered online using commercially available software (SurveyMonkey®). The web based nature of the survey facilitated completion at a time and place convenient to respondents and allowed for ready download of responses to an electronic database (Microsoft Excel®).

Ethical considerations

This survey met the Health Research Authority definition of 'service evaluation' as it sought to define current care and standards across multiple services, did not involve a patient care intervention and collected existing data.¹⁴ Participants were not required to divulge personal identifiable information and responses were anonymised using random identification numbers allocated by the SurveyMonkey® software. A favourable ethical opinion was obtained from the university research ethics committee (SHREC/RP 238).

Questionnaire development & piloting

The highly structured survey comprised closed and forced response questions to collect factual data. Limited character 'free-text response' boxes allowed participants to add further information when selecting 'other, please specify' options. Early questions asked about demographic and professional characteristics and MIIR practices. Later sections sought participant opinion about variations in practice that had been observed anecdotally by the researcher and issues that had been raised in the existing peer

reviewed literature about radiographer performed MIIR. At the end of the questionnaire, respondents interested in participating in further research were invited to contact the researcher by email, outside the survey to preserve the anonymity of their responses.

An initial paper draft of the questionnaire was piloted for face and content validity.¹² Four members of university faculty not involved directly in the project but with experience of designing questionnaires for student research were asked to work through the questionnaire. Following discussion, where they felt the presentation, instructions and questions were not simple, clear, comprehensible and unambiguous, revisions were made. A second pilot of the revised wording and layout was undertaken using the SurveyMonkey® software with six breast imaging postgraduate students familiar with the response data required. Any potential target participants, for example students who were involved in MIIR, were excluded from the online pilot. Again, following discussion minor modifications were made to ensure that the survey operated as intended, generated the required data and effectively guided participants through the filter and 'skip' questions.

Questionnaire administration and participant recruitment

The study had no sampling frame because there is no register of radiographers involved in MIIR in the UK – it is not known how many radiographers are qualified and/or practising MIIR in NHS screening or symptomatic breast services. To reach the largest number of potential participants a hardcopy mailshot was posted to all (n = 103) NHSBSP units, all (n = 206) NHS Trusts offering symptomatic breast imaging services listed on 'NHS Choices' (www.nhs.uk) and to all (n = 45) ex-students of the researcher's host university MIIR modules.

The recruitment mailshot contained a covering letter, participant information sheet (PIS) and A4 poster, all containing the online survey web address. The covering letter invited departmental managers to circulate the PIS to relevant members of staff and display the poster on staff noticeboards. Ex-students were sent an individual covering letter and PIS. A notice advertising the survey was published in the Society of Radiographers' professional magazine 'Imaging and Therapy Practice'. The survey was open for three months during April to June 2012.

Following distribution of posters and PIS, participants had 3 months to make an informed choice to participate in the study. Participants had to tick a box confirming that they had read and understood the PIS and consented to take part, on the preliminary page of the survey.

Data analysis

The survey results were predominantly quantitative nominal and interval data and were coded and analysed using SurveyMonkey® and Microsoft Excel® software. Data were collated using simple and derived mathematical measures (frequency, percentage) and summary descriptive statistics (mean, mode and range). These data described the personal and professional characteristics of the respondents and the nature of their MIIR practices (workload, case mix and diagnostic decision making responsibility). Inferential statistics (t tests) were used to compare sub-group data.

Study limitations

The following limitations are acknowledged in the study. A recognised risk of questionnaires which are administered remotely, asynchronously and by self-completion is missing data.¹² The questionnaire used in this study was piloted to try to reduce the risk of participants not understanding or misunderstanding the

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